NATURAL RESOURCES CONSERVATION SERVICE

CONSERVATION PRACTICE STANDARD

Dam, Floodwater Retarding

(Number and Acre-Feet)

Code 402

DEFINITION

A single-purpose dam designed for temporary storage of floodwater and for its controlled release.

PURPOSES

To reduce flood damages downstream by controlling the release rate from flood flows of predetermined frequencies. They may also permit the use of more economical channel modifications or stabilizing structures in the channel downstream and reduce environmental hazards and pollution.

CONDITIONS WHERE PRACTICE APPLIES

This practice applies only to sites meeting all the following conditions:

1. Topographic, geologic, and soils conditions at the proposed site are satisfactory for the development of a feasible dam and reservoir.

2. The sediment yield at the site is not excessive.

CRITERIA

All dams designed under this standard shall meet or exceed the criteria as called for in the standard for ponds (378) or in TR-60, as appropriate, except as specifically modified by this standard.

The capacity of the principal spillway shall be adequate to discharge, in 10 days or less, the floodwater storage needed to provide the desired level of protection to the downstream benefited area. Storage provided primarily for the purpose of reducing the frequency of use of the emergency spillway need not be included in this 10-day drawdown limitation. The determination of capacity must be based on consideration of the benefits that accrue to the reduction in the discharge rate, damages that may result from prolonged storage in the retarding pool, damages that may result from prolonged outflow, and limitations in water rights or other legal requirements. Longer release times may be used if warranted by downstream conditions. The discharge through gated outlets shall not be considered in determining the emptying time of the retarding pool.

The elevation of the crest of the lowest stage of the principal spillway shall be set at the elevation of the sediment pool. For dry dams, the riser shall be designed to permit design discharge at the sediment pool elevation with provisions for discharging water at lower elevations to satisfy the functional requirements of the structure.

All parts of the principal spillway, except attached gates and trash racks, shall have an expected service life equal to or greater than the design life of the structure or provisions made for replacement. Principal spillways shall meet the requirements with respect to materials established in the standard for ponds (378) or in TR-60, as appropriate.

The minimum diameter of the conduit used as a principal spillway shall be 10 inches.

The sediment storage volume shall not be less than the expected sediment accumulation during a period equal to the design life.

The retarding storage requirements shall be of such as to contain the runoff expected to occur at a frequency consistent with the level of protection to be provided to the downstream benefited area, with proper allowance for discharge through the principal spillway. The retarding storage capacity shall be sufficient to limit the use of the emergency spillway to a permissible frequency and duration based upon consideration of the erosion resistance of the spillway material and vegetative protection to be provided.

CONSIDERATIONS

A floodwater retarding dam should be part of the treatment needed to protect soil, water, plant, animal and air resources. In addition, a conservation cropping system, conservation tillage, crop residue management or other appropriate system should be planned to control erosion above the impoundment and protect the other resources. The management system must be planned to prevent excessive maintenance and operation problems.

Effects on water quantity and quality shall be considered. This practice will reduce downstream flow rates during periods of runoff. Overall surface water quantity may be reduced by evaporation from the water surface of the reservoir, increased seepage to the ground water and raising of the phreatic line in the vicinity of the pool. Usually, the overall decrease is minor. Moreover, the quantity of surface water usually will increase during periods of normally low flow due to prolonged duration of flow from the reservoir. Ground water quantity will increase by the amount of infiltration through the reservoir sides and bottom that reach the saturated zone.

Surface water quality will be improved by a floodwater retarding structure, due to entrapment of suspended sediments, bedload, nutrients, chemicals, etc. in pool area. If downstream banks and channel are stabilized, the release water quality may be improved by reduction in sediment trapped. If downstream bed and banks are not stabilized, the cleaner water from the reservoir will often pick up a new sediment load from the downstream channel and can cause channel deepening and widening, which may cause tributaries to become unstable. The longer periods of flow may increase the degree of bank saturation resulting in slumps and slides, increasing downstream sediment loading. Generally, water quality will be better than before the structure is installed, except for the first few months immediately after construction.

The construction of a sediment pool behind the dam will increase the temperature and lower the dissolved oxygen of the water retained. The trapped sediments may act as a sink for adsorbed nutrients and pesticides. The type of outlet structure will influence the dissolved oxygen level and temperature of the surface water downstream.

Ground water quality will be unchanged with the exception of soluble nutrients and pesticides which may percolate through the reservoir sides and bottom and downstream channels during prolonged outflow.

Special attention shall be given to maintaining and improving visual resources and habitat for fish and wildlife where applicable. The landowner/user will be advised if wetlands will be affected and USDA-NRCS wetland policy will apply. All work planned shall be in compliance with General Manual Title 450-GM, Part 405, Subpart A, Compliance with Federal, State, and local laws and Regulations. If archaeological or historical properties are encountered, the USDA-NRCS policy in General Manual Title 420-GM, Part 401 shall be followed.

PLANS AND SPECIFICATIONS

Plans and specifications for installing floodwater retarding dams shall be in keeping with this standard and shall describe the requirements for applying the practice to achieve its intended purpose.

Specifications for construction of floodwater retarding dams within the scope of the standard ponds (378) shall, as a minimum, be commensurate with those for ponds (378). Those within the scope of the criteria in TR_60 shall be in accord with the guide specifications contained in the National Engineering Handbook, Section 20.

OPERATION AND MAINTENANCE

A maintenance program shall be established by the landowner/user to maintain capacity and vegetative cover. Items to consider are:

1. Do not graze protected area of embankment and impoundment area or provide well managed grazing.

2. Fertilize to maintain a vigorous vegetative cover in protected area. Caution should be used with fertilization to maintain water quality.

3. Mulch, spray or chop out undesirable vegetation periodically to prevent growth of large woody stemmed weeds, water plants such as cattails or trees (such as willows) from embankment and spillway areas. Caution should be used to use only chemicals approved for this use as noted on the label.

4. Promptly repair eroded areas.

5. Promptly remove any burrowing rodents that may invade area of embankment.

6. Reestablish vegetative cover immediately where scour erosion has removed established seeding.

7. Keep open all spillways and remove trash that may accumulate around entrance.

8. Periodically inspect area for any new maintenance items and if any are observed take immediate action to protect from further damage or deterioration.